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ABSTRACT

This paper describes a state-funded project at Southeastern Louisiana University that offered coursework and direct classroom assistance to general educators attempting to include students with disabilities for mathematics and science instruction. Thirty-five general educators in five parish school systems participated. A sequence of three credit courses was developed to include instruction in collaboration skills, in curricula/test accommodations, and in behavior management. The paper offers examples of how the general educator participants applied learned principles in inclusive settings including practical application of mathematics skills in a school coffee and beignet shop, mock elections, cultivating a school vegetable garden, collecting and analyzing water samples, and conducting field trips. The project was effective in dispensing information to general educators in curricular accommodations, behavior management techniques, and collaboration skills and participants were also successfully applying this information in their home classrooms. Pre- and post-testing indicated significant changes in attitudes toward inclusion and knowledge of special education. Twenty-three participants continued on to become certified in special education. Problems encountered included participant attrition, recruitment difficulties, and limited course options. (Contains 10 references.) (DB)

Supporting General Educators' Inclusive Practices in Mathematics and Science Education

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Historically general and special education teacher training programs were highly specialized and reflected separate curricula for prospective teachers. This type of training mirrored the separatism in public schools where students with disabilities were served in self-contained or "pull-out" classrooms. However, the civil rights movements and demands to include diversity in the mainstream of society have influenced educational institutions at different levels. Colleges of education are slowly but surely merging departments of regular and special education and faculty members are collaborating on various projects. An increasing number of states are requiring preservice general education teachers to participate in introductory or mainstreaming courses in special education. However, these courses are not enough to prepare general teachers for the challenges of inclusion. Welch and Sheridan (1993) have criticized these attempts as being superficial because they tend to uphold stereotypes and attitudes that reinforce perceived differences. The results of a study conducted by Fender and Fielder (1990) indicated that 80% of the survey's respondents stated that a 3 credit hour special education course was required by their state certification agency and 85.5 % stated that it was a university requirement. In addition, 67.5 % reported that information on disabilities was integrated into general education courses. Sixty-one percent of the students enrolled in a special education course were elementary education majors and 29.8% were secondary majors. It was interesting to note that 33.5% of the respondents indicated that a field experience was one of the course requirements, but 28.9% of participants said that their course did not include this component. Significant reforms are needed to genuinely integrate students with disabilities in the mainstream of

education, and teachers must be provided with the competencies necessary to achieve this goal. A few projects have attempted to introduce viable options to increase the skills of general educators to teach students with disabilities in inclusive classrooms.

At the University of Utah a federally funded project called the Site-Based Transdisciplinary Educational Partnerships (STEP) attempted to bring together faculties and students from various disciplines to work toward a common goal. University students from Educational Studies, Special Education, Educational Psychology, and Educational Administration engaged in collaborative activities over two academic quarters while working with students with special needs including students with disabilities. The result of the data collected indicated that the subjects who had received special education coursework reported a higher confidence level in their knowledge base and ability to work with their charges (Mayhew, 1994).

Project Inclusion

In Louisiana, Project Inclusion, a state funded project at Southeastern Louisiana University, offered coursework to general educators and assistance to the participants' schools in their efforts to include students with disabilities in general classrooms. Course instruction focused on techniques and strategies for working with students with disabilities. Thirty-five general educators in five parish school systems in the University service area participated in the project. The participants received tuition stipends for nine credit hours in special education. A sequence of courses was selected to include instruction in collaboration skills, in curricula/test accommodations, and in behavior management.

Disruptive behavior appears to be a major concern for general education teachers (Norman, Richardson, & Saavedra, 1998). Students constantly exhibiting deviant behaviors are generally not welcomed in general education settings. Teachers do not feel prepared to deal with their social deficits, especially aggressive and acting out behaviors. The project's behavior management course provided information and strategies from behavioral models as well as from humanistic, ecological, cognitive, and biophysical frameworks. In addition, course content included information on functional behavior assessment and intervention. General education teachers were taught to identify specific environmental and social factors affecting students' behaviors and to develop effective strategies for improvement. They became aware of antecedents that trigger inappropriate behaviors and learned about ways to change environmental variables that affect the student's behavior. Course content also addressed proactive intervention such as character education, social skills education, and classroom organization.

Interprofessional collaboration is essential in problem solving and in achieving an effective working relationship among teachers. The project's collaboration course provided the participants with information in interpersonal and intrapersonal personal analysis. Participants completed a personality inventory, a learning style inventory, and learned to appreciate and celebrate differences. They also learned the importance of flexing to differences and how to adapt to difficult situations. The instructor introduced various models of collaboration and strategies for identifying problems and resolving conflicts. Friend and Cook's model (1996), based on democratic principles of equality, describes the collaboration process. Friend and Cook believe that in the collaboration process, individuals must be committed to at least one common goal. This goal should be specific and important enough to maintain a shared commitment.

Shared responsibility for decision-making is essential in maintaining a sense of equal participation. Collaboration must be voluntary to be truly successful. Every member of a collaborative group must agree to work jointly in a cooperative spirit. Mandates, laws, and regulations can force people to present a collaborative front, however, the behavior will only be superficial when negative attitudes persist. Individual and group attitude can be changed through knowledge and understanding of self and of others.

The third course investigated curricular and test accommodations. The participants were taught to develop and administer informal and performance based assessments and became familiar with various strategies for engaging in formal test taking. Strategies for teaching reading, written language, mathematics, and science were explored to assist students in taking part in the general curriculum. As part of the course requirements, participants developed cross-curricular modules to help students with disabilities find meaning in specific facts and relate them to larger concepts across curricular areas. Students are more likely to generalize their learning through interdisciplinary lessons that stress the connections between various content areas. Students are able to make connections and discover relevancy to their learning when they are actively involved (Kober, 1993). The participants developed activities that encourage students to work collaboratively in cooperative groups. The goal of Project Inclusion was to offer assistance in areas of pressing concern among general educators. Table 1 summarizes the Project courses.

Table 1: Description of Courses Offered in Project Inclusion

Course	Description	Why Selected	Course Objectives	Course Requirements
SPED 612: Behavioral Assessment and Intervention with Students with Disabilities	Practical application of strategies with students with disabilities.	A major concern of general education teachers is disruptive behavior.	Participants will become knowledgeable of various procedures in behavior management.	SPED 200/600 (Introduction to Exceptional Children) or permission of the Department Head.
SPED 613: Consulting Teacher strategies	A study of effective techniques and strategies of collaboration and communication in the schools.	A second concern revolved around territorial issuescommunic ation issues.	Participants will explore issues for collaboration, communication and cooperation.	SPED 200/600 (Introduction to Exceptionaal Children) or permission of the Department Head.
SPED 662: Approaches to Teaching Students with Learning and Behavior Problems	Investigation of the various instructional models for teaching students with disabilities.	A third concern of general education teachers is accommodation to the general curriculum.	Participants will apply strategies to promote success in academic achievement.	SPED 200/600 (Introduction to Exceptional Children) or permission of the Department Head.

Mathematics and Science for Students with Disabilities

It is important that students with disabilities actively participate in a learning environment guided by an involved teacher. Project Inclusion participants developed strategies to assist students in investigating, discovering, communicating, reasoning, and applying

mathematics and scientific concepts through experiential learning. All students can develop critical thinking skills by learning and practicing strategies involving cognitive and metacognitive processes in every area of life. (Stephanich, 1995).

Conversely, the highly structured setting of the direct teaching approach has its benefits with at-risk students. Students with disabilities frequently display weak metacognitive skills and require direct instruction. Graham (1996) explains that there is a need to integrate both constructivistic and reductionistic (skill instruction) approaches to teach learners with special needs. Harris & Crawford and White (1999) describe constructivistic classrooms as representing energy. In these classes students are actively engaged in their learning and are introduced to the "big" picture via strategies to accommodate and compensate for their disabilities (Carnine, Dixon, & Kameenui, 1994).

Several Project Inclusion participants implemented some excellent mathematics strategies that were effective with all students. Particular care was taken to ensure that the participants taught strategies and skills that could relate to student's practical application of mathematical abilities. One very successful project involved a school that developed a coffee and beignet shop. Students prepared café latte, café au lait, and beignets for the faculty and staff. The students set prices for the service based on cost of supplies and estimated cost of labor. Students learned to collect and count money, as well as learning how to calculate percentages and develop an understanding of percentages, profit and loss, and basic economic principles. Additionally, Project Inclusion participants applied numerous multisensory techniques using manipulatives and ordinary classroom objects to the develop students' mathematical abilities. Some examples of this include using beans and coins as manipulatives in mathematical

equations, asking students to calculate percentages of students in the room with different characteristics, holding mock elections and asking students to manipulate the results in various ways, and using recipes to learn how to measure as well as how to add, divide, and multiply fractional measurements.

One participant integrated activities from mathematics, language arts, and science by involving cooperative groups of middle school adolescents in cultivating a vegetable garden on the school grounds. These students conducted a web search of the different types of seeds and soil suitable for their garden. Consequently, they planted, harvested and sold their products to faculty members and parents. Students with and without disabilities learned and worked together and documented their efforts in a journal.

The project participants were expected to generalize what they learned in each course and implement these practices in their classrooms. They were encouraged to allow their students to select topics that were particular to their level of interests. In science, cooperative projects included a class that produced a video and wrote essays on student observations at the Nature Center in New Orleans. In a "Save Our Lake" project students collected and analyzed water drawn from Lake Ponchartrain and developed activities to raise awareness of the negative effects pollution can have on our environment. Field trips were planned to the Aquarium of the Americas and the Audibon Zoo. Following these trips, students were involved in animated discussion and activities related to the experience.

Discussion

In general, Project Inclusion attained its primary goal of dispensing information to general educators in curricular accommodations, behavior management techniques, and

collaboration skills. In addition, the participants were successful in transferring what they learned, and were capable of applying the information. Problems encountered included: (1) Participant attrition: A number of participants dropped out of the program because of course requirements and expectations. Facilitators of the Project should have laid out expectations more clearly during the initial interview process. (2) Recruitment strategies: Recruiting participants was difficult and time consuming. The project's facilitators spent much time travelling to schools disseminating information about the project. Establishing a Project Inclusion Advisory Board comprised of public school administrators and university personnel could have facilitated the process of recruiting. (3) Limited course options: Scheduling was a problem for some participants. Project Inclusion is presently in its third year and has increased options to five courses. In addition to the original three courses, a course in classroom organization and management for students with disabilities was added, along with a course in methods of teaching basic subjects to students with disabilities. The Project requires that participants complete three out of the five courses.

Participants of Project Inclusion were required to develop portfolios of the instructional accommodations they implemented and found useful for teaching students with special needs. In addition, they researched and implemented techniques for helping students develop study skills and test-taking skills. The project director and the coordinator traveled to the participants' schools and offered their expertise at the invitation of the school principals. Workshops were conducted to involve faculty members from special and general education. The project extended for two years and was re-funded for an additional two years. As a result of the project, 23 general educators continued to take courses and were certified in special education. Five teachers

pursued Master's degrees in special education.

At the beginning of the course work, two instruments were completed by the participants; one measuring attitudes toward inclusion and the other measuring knowledge of special education. A significant gain from pretest to posttest indicated improved attitudes and an increase in knowledge. An interview with each participant reinforced the project's rationale. Following are a few of the comments expressed by the participants at the exit interview.

- I co-teach in an inclusion classroom. Understanding personality differences helped me to collaborate with my co-worker. She is an ISTJ, very organized and meticulous, whereas, I am an ENFP, somewhat disorganized. We are working it out. She is helping me to organize my files, and I am helping her to use creative activities with the students. And we are no longer resentful of our differences.
- I teach science in a high school. At first I was unwilling to let the students with disabilities work with the expensive equipment. I have learned that, with time and effort, all children can learn.
- The behavior management strategies I learned are applicable for all my students.
- It is very rewarding to see students working together regardless of differences. Having students with disabilities in my classroom is teaching my other students patience and tolerance.
- It is still very frustrating to see students with disabilities struggle when they are tested. But I feel better prepared to help them.
- All general educators should take courses to teach special learners.

- I learned strategies that will not only help students with disabilities but will also allow me to provide appropriate instruction to many other students in my classroom. Thank you.

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